

PET User Notes

Publication of the PET User Group P.O. Box 371 Montgomeryville, PA 18936

Volume 1 Issue 6

September-October 1978

General Notes

We (PET User Notes) have one more issue after this one. The first volume will have 7 issues. We have been including all back issues on an annual basis, with the exception of issue 1. The first issue was more or less a prospectus with no important information, so we didn't get it reprinted.

We currently mail about 2400 copies. The total operation is more work than I had anticipated, and I have considered not keeping it going after the end of the year. I have received a lot of encouraging notes, but really don't know how many of you will sign up again.

Also, I have been squeezed a tiny bit on costs, so if you want to keep it going, the cost will be \$6 for 6 issues. (Those of you who have already re-subscribed will receive the issues at the old \$5 rate). We might go monthly if I find more time, so note that it is \$6 for 6 issues, as opposed to \$6 a year. Overseas air mail (outside of U.S. and Canada) will be \$6 additional.

Due to some of the economies of scale, if many of you don't renew, I will refund all money and fold my tent (that might even give me some time to play with the PET and my wife).

I plan to keep the format about the same, but welcome any suggestions you might have (please don't write about leaving enough space at the page edge for a 3 hole punch--I've asked the printer to do this the last several issues, but apparently have not phrased the question correctly--I will try drawing the holes on the pages this time).

Commodore has been sending some enhanced documentation manuals entitled "PET Communication with the Outside World" to existing owners. The manual describes the various I/O ports, pinouts, addresses, and file handling techniques. If you have not received a copy, make sure you jog the people from whom you purchased your PET (not Commodore if you didn't buy from them). This manual is apparently still not the final documentation, but no indication of when the one currently in the works will be ready.

Commodore has also been sending "Machine Language Monitor", "Squiggle", and "Big Time" programs on tape along with an explanatory booklet. Again, ask the people you bought from if you haven't received the package.

New ROMs are in process at Commodore which will correct the BASIC and operating system bugs and add the Machine Language Monitor. Suspected availability is mid-November.

An update on the Commodore disk: about 165 K per drive with nice features like variable length records and ability to spread a file over more than one physical drive; 1979 availability.

Commodore is also saying again they will be printing their own User Notes. From a personal standpoint, I would rather see them concentrate their efforts on designing and producing hardware, firmware, and manuals rather than on user notes and software.

A recent announcement indicated Commodore will begin assembling PETs at their Eaglescliffe, England location, and expect to be at the 1000/month level within 4 months. The same news release also stated Commodore is at a 4500/month production level in the U.S.

I have seen a copy of CURSOR cassette "magazine" for PET, published by Ron Jeffries, Box 550, Goleta, CA 93017. Ron puts about 5 PET programs on tape and mails first class on a monthly basis, 12 issues for \$24. At \$2 a tape, you can't go far wrong.

Have received several requests for info on how to acquire 6550 RAM chips at a reasonable price (Commodore has them at \$30) or how to adapt the 2114 to replace the 6550 in older PETs.

Kilobaud has their "Instant Software" sales program up and going now. They emphasize the TRS-80, but are offering some PET programs at \$7.95 (and looking for software authors).

Calculators/Computers Magazine keeps adding more computer material, with emphasis on PET and TRS-80 for classroom applications. If you are involved in that area, or have children ready to learn math and logical structures, it's an excellent publication. Their contributing editors include Bob Albrecht and Mac Oglesby, both of whom use the PET. Box 310, Menlo Park, CA 94025.

Creative Computing plans to include several pages on PET in each issue. The info will be edited by Greg Yob, who has much PET experience. Most of you have probably also seen some of the PET programs Creative Computing is selling--generally at \$7.95 for 5 or 6 programs.

For those of you interested in 6502 single board based systems (KIM, SYM (VIM), AIM, etc.), Eric Rehnke publishes USER NOTES: 6502, Box 33093, N. Royalton, Ohio 44133 at \$13 for 6 issues. Eric recently left MOS Technology, and says he will be spending full time on his notes.

Sigma Associates, Box 379, South Boundbrook, NJ 08880 has an interface to attach the low cost SWTP 40 column printer to PET's IEEE port. The unit comes assembled for \$39.95. Sounds like a good buy -- for \$250 for the printer plus the interface you can have print capability.

I saw Eldon Berg of E. Berg Publications at the Philadelphia computer show. He was promoting his Periodical Guide for Computerists (a nicely done computer magazine article reference and index list--\$5/year--1360 S.W. 199th Ct., Aloha, OR 97005). Eldon was also demonstrating a PET keyboard interface (including a character translation EPROM) for an ASCII keyboard. It even allowed upper/lower case shifts to operate normally. I had high hopes that Eldon would sell the interface kit. He just reported that he won't, but that GRI, Inc will (see next paragraph).

George Risk Industries announced PERK (... External Real Keyboard). It is an assembled full size keyboard with case, power supply, cables and plugs, and PET interface to allow normal shift and shift lock, standard CRT cursor control functions, full screen editing, etc. Robert Nickels at GRI, GRI Plaza, Kimball, NB 69145.

CGRS Microtech, Box 368, Southampton, PA 18966 announced their EXS-100/floppy disk package for PET at \$695. This includes the EXS-100 disk controller (for up to 3 drives) combined with an S-100 interface, an SA-400 minifloppy drive, cabinet, cables, power supply, and some system software. Joe Swope 215-757-0284.

Technical Hardware Inc. (Thinc) Box 3609, Fullerton, CA 92634 sells ADAK-1-PET for \$99.50 (assembled). The package includes the analogue interface card, connectors (for parallel port), instructions, and software cassette. The announcement stated the software was primarily machine language, and included utilities, A-D conversion, Fourier synthesis (to combine up to 11 harmonic overtones), music generation, and examples (several paddle games and songs).

PET User Notes published 6 (or more) times a year by Gene Beals, PET User Group, Box 371, Montgomeryville, PA 18936. Subscription is \$6 for 6 issues in U.S. and Canada, and \$12 for airmail to other countries. Copyright 1978.

3 G Company, Incorporated, Rt 3 Box 28A, Gaston, OR 97119 (503) 662-4492 announced a light pen for PET at \$24.95 including sample program and instructions.

Detlef Hartmann, Undinestr. 49, 1000 Berlin 45, Germany has a machine language routine to merge BASIC programs for PET. The user must have BASIC line numbers appropriately prearranged. For 20 DM you will receive a program listing (not a tape).

PET Software Exchange, Lincoln Computer Club, Lincoln School, 750 E. Yosemite, Manteca, CA 95336 -- a group of 60 seventh and eighth grade students wishing to exchange PET programs -- send SASE for their list.

Catalyst Computer Center, attn: J. Reinders, Lakeland High School, 1630 Bogie Lake Rd, Milford, MI 48042 will send a nice copy of BIORYTHM (which uses a line printer for plotting) if you send a blank tape and a donation of at least \$3. They want to pay for the computer equipment they have (its a student funded project).

Those interested in forming a local users group in northern Virginia area please contact Robert Karpen, 2054 Eakins Ct., Reston, VA 22091 (703) 860-9116.

My apologies for being a little late again. Also, sorry to be so slow in getting the memory maps mailed out. I did make extra copies, however, so if you want the info (5 pages of memory map and addresses plus a nice 2 page chart by Jim Butterfield depicting equivalent decimal codes for PET screen, POKE, PRINT, assembler mnemonics, etc.) send a SASE plus 2 extra stamps for copy cost.

FOR-NEXT and GOSUB-RETURN Structures

Jim Butterfield

Just to clear up possible confusion .. FOR-NEXT and GOSUB-RETURN combinations are interlinked, and you'll have to obey certain rules:

1. If you're in one or more FOR/NEXT loops, and GOSUB to a subroutine, you can't give a valid NEXT within the subroutine. In effect, the outer FOR/NEXT loops are disconnected until you RETURN. You can use the variables, and even change them (although this is often unwise), but you can't say NEXT within the subroutine if you didn't say FOR there.

2. If you start a FOR loop within a subroutine and then RETURN, the FOR loop will be cancelled.

3. If you have a group of nested FOR statements, e.g.
100 FOR J= ...
200 FOR K= ...
300 FOR L= ...

the inner loops will be cancelled (in this case, K and L) if you say either NEXT J or give another FOR J= ... This can be useful, since you want to abort a loop in many cases (for example, when you've found the table entry you want). It can be a useful habit to always use the same variable name on your outermost loops - this way, all inner loops will automatically cancel when you start a new main loop.

4. FOR loops have a very nice construction -- you can do quite useful things with the parameters. For example, FOR J=J TO 10 will take J from its existing value up to 10. If you use an expression such as FOR J=1 TO A STEP P*3 remember that the limit (A) and the step size (P*3) are computed on the spot. Changing the value of A and P within the loop won't affect the operation.

5. For those who like keeping track of memory, an active FOR-NEXT loop uses up 18 locations in the stack, and an active GOSUB uses 5 locations. You have about 200 locations at your disposal in the stack. Use them up and you'll get an OUT OF MEMORY notice -- even though the FRE(0) shows plenty of memory available.

6. A final word of caution: always use the variable name in your NEXT statement (say NEXT Y instead of just NEXT) unless you're sure the loop will run to completion. I recommend you do it anyway -- it will prevent you getting into bad habits.

HEAD ALIGNMENT FOR THE PET

Grant Paul Needham, Mass.

The drive mechanism of the PET's tape unit is similar to those found in inexpensive audio cassette recorders and is not particularly noted for its ruggedness. This mechanism, including the tape heads, takes a lot of mechanical abuse from frequent starts, stops, rewinds, etc. After a period of time, it is possible for the record/play head to go out of alignment (particularly if the original adjustment was set marginally at the factory), causing read errors to develop. The alignment of the tape head is usually quite critical and normally requires the use of a test tape along with an oscilloscope (or meter); however, the technique described below can be used with excellent results and without the use of any specialized equipment (other than the PET itself).

First and foremost, make sure your tape heads and capstan are clean, and that the heads have been properly demagnetized. Second, load in a program (preferably a lengthy one) which was recorded on a quality cassette tape. After loading, PEEK at memory location 630, i.e. PRINT PEEK(630). The value returned by the PET divided by 2 gives the number of dropouts encountered in reading the tape. Ideally, this number is zero (and frequently is), but an occasional low number is probably all right. A consistently high number, on the other hand, is an indication of a problem. There are several possibilities for excessively high drop outs, which include using a defective or poor quality cassette (try loading programs from other tapes), mechanical slippage (make sure the drive belt, idler wheels, and capstan are clean), and faulty electronics; however, the chances are quite good that the record/play head is out of alignment.

To realign the head, first turn off the PET and remove the cassette recorder from the unit. Disassemble the top and bottom halves of the recorder's plastic case and remove the mechanism. The record/play head (which is located to the right of the erase head) is now fully accessible. Upon examination, you will note that this head is held down by two small screws. The screw to the left, which is spring loaded, is the alignment screw, and the one you will be adjusting.

The alignment procedure can be performed relatively easily using the following steps:

1. With a toothpick and some paint or nail polish carefully mark one dot on the head of the alignment screw and another dot next to it. These markings serve as a reference point when turning the screw.
2. Connect the tape recorder cable to the main circuit board of the PET and turn the unit on.
3. Load in a program and PEEK at memory location 630. Note the number of drop outs.
4. Now with a small non-magnetic screwdriver carefully rotate the adjusting screw 1/16 of a turn.
5. Reload the program and note the number of drop outs. If the drop outs increased significantly, the adjusting screw was turned in the wrong direction.
6. Repeat steps 4 and 5 until the number of drop outs is reduced to zero (or to a low level). The final screw adjustment usually does not require more than $\pm 1/8$ of a turn from the original position.
7. Before reassembling the unit, try loading programs from several other tapes to make sure everything is working properly.

The entire head alignment process for my PET's tape recorder took approximately 30 minutes, and I am once again able to read tapes with excellent reliability.

SOFTWARE for PET

KITE FIGHT A two player action game that needs no joystick. It is completely original with its own unique strategies. Includes four pages on real Indian Fighter Kites. Written by Michael Riley.

SIMON Simon says listen to the notes. Simon says watch the blinking squares. Simon says repeat what you heard and saw. Simon is a fun game to test and develop memory skills. Great graphics and sound. Written by Michael Riley.

BOTH FOR \$7.95

LUNAR LANDER Guide your craft down with the most sophisticated equipment. If perchance you have problems, switch to auto-pilot and watch how it should be done. Hear Lunar Module sounds as you descend and hear the Star Spangled Banner upon a successful landing. Written by veteran pilot and songwriter Jeff Jesse and Bob Freeman.

MORSE CODE Ever wonder what all that chatter meant? Here's your chance to train your hand and mind to acquire the habit painlessly with your faithful friend, your PET. MORSE CODE will sound out any letters that your key in, or it will give you the sounds for code recognition practice. Written by a veteran ham and PET lover, Bob Freeman.

BOTH FOR \$9.95

ABTAPE1 Includes Life, Biorythm, Othello, Mastermind II, Multiprimer (math tutorial-deduction game) and Klingon Capture. \$8

MICROCHESS 2.0 for PET by Peter Jennings \$19.95
Select any of 8 levels of play, or let MICROCHESS play against itself

BOOKS books BOOKS books BOOKS

The Little Book of BASIC Style: How to write a program you can read \$5.25
Basic BASIC - James S. Coan \$8.00
Game Playing with BASIC - Donald D. Spencer \$6.00
Advanced BASIC - James S. Coan \$7.00
BASIC From the Ground Up - David E. Simon \$7.75
My Computer Likes Me +when I speak BASIC - B Albrecht \$2.00
Instant BASIC - Jerald R. Brown \$6.00
BASIC and the Personal Computer - Dwyer & Critchfield \$12.95

The BASIC Workbook: Creative Techniques for Beginning Programmers - Kenneth E. Schoman, Jr. \$5.50
How to Profit From Your Personal Computer - TG Lewis \$7.00
Stimulating Simulations - Dr. C William Engle \$4.00
The Mind Appliance: Home Computer Applications \$6.95
For Machine Language and Hardware People --
Programming a Microcomputer:6502 - Caxton Foster \$8.95
6500 Programming Manual - MOS Technology \$6.50
6500 Hardware Manual - MOS Technology \$6.50
Hewlett-Packard IEEE-488 Standards Manual \$1.50

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Programs on Tape

A correction from last time -- MAXIT, by Harry J. Saal is available from the author directly at \$4.95 (810 Garland Drive, Palo Alto, CA 94303). The program is a very nicely done logical game for either 2 players, or 1 player vs. PET (which plays quite well).

Earl Wuchter has written an excellent DRAW POKER program-- nice graphics, and the dealer (PET) raises, bluffs, seldom folds (which makes it fun), and doesn't cheat, Earl adds.

PET RENUMBER, by Bill Seiler, is an excellent BASIC statement renumbering program written in machine language. It resides in the high 384 bytes of memory and uses screen memory for a line number buffer. The program moves portions of your BASIC program forward or backward in memory as necessary to insert new line number references. If you would like a copy of Bill's nicely commented assembler source, send a SASE and 2 extra stamps to cover copy cost of 7 pages of listings.

SEQUENCE -- you have to sort a character list
 STATECAPS -- quiz on states and capitals from Kilobaud 3/78
 RACETRACK -- see listing in V. 1, Issue 3 - RE McGee
 DEFLECTION -- F Dunlap
 ADDITION -- math drill -- F Dunlap, C Pitcairn
 OTHELLO -- from Byte 9/77
 OTHELLO for 2 -- F Dunlap
 BAGELS -- like Mastermind - J Butterfield
 Cash flow/Return on Investment - R Goldsmith
 STAR TREK
 BLACKJACK -- D Lien - nice graphics, humorous patter by dealer
 LIFE 40*25 -- F Covitz
 LIFE 64*64 -- F Covitz
 DO-ALL -- JK Johnson from Kilobaud
 TRAP -- trap the PET, avoid being trapped
 SUPER MASTERMIND -- JR Marcou
 LUNAR LANDER -- JR Marcou
 NIM -- J Butterfield
 QUBIC -- 3D Tic-Tac-Toe
 LIST MEMORY -- Charles Combs
 MACHINE LANGUAGE MONITOR -- loads in low memory
 TIME -- large clock display
 BINARY -- Kenneth Finn - very concise code - plots with only 30 BASIC statements
 KING -- business-social simulation game
 BREAKOUT -- J Butterfield - paddle ball
 SWATPLOT -- F Campbell (see V.1, Issue 3) - plots in 80*50 format
 TYPEWRITER -- M Richter, R Julin - no printer interface yet
 WUMPUS
 MARKET -- corporate simulation
 CONCENTRATION -- Francis Chambers - displays 52 cards
 ESP TEST -- Francis Chambers
 SHARK BAIT -- JK Johnson - hangman style program
 FLEA RACE -- JK Johnson
 AWARI -- Hans-J Koch - German instructions - nice graphics
 CHASE with Sound
 STAR LANES -- Gerald Hasty - from Interface Age
 KALEIDOSCOPE -- Jerry Panofsky - People's Computers
 HEXDEC -- Wayne Reindollar - converts and pokes values into memory for machine language programs
 24 Second QUBIC -- Mike Louder
 DOODLER -- Jim Brannan - draw type program
 GNIP GNOP -- Jim Brannan - 2 player ping pong
 PONG -- People's Computers
 CURFIT -- J Butterfield - fits data to 6 curves
 TRIANGLE -- J Butterfield - solves any triangle
 METRIC -- J Butterfield - does metric conversions
 DATES -- J Butterfield - day of week, days between
 TRENDLINE -- J Butterfield - fits, forecasts, graphs
 MILEAGE -- J Butterfield - distances from Latitude/Longitude
 FACTORS -- J Butterfield - prime factors for any number
 MORTGAGE -- J Butterfield - schedule of payments
 FINANCE -- J Butterfield - present, future value etc.
 ADDER -- Earl Wuchter - functions as an adding machine (nicely done)

BATTLESIPS -- J Butterfield - you vs. computer
 MOONLANDER -- J Butterfield - graphics
 CRYPTO -- J Butterfield - cryptogram solving aid
 JOTTO -- J Butterfield - guess a word
 POEMS -- J Butterfield - write poetry
 MYSTERY -- J Butterfield - you can't list it!
 HINONDIS -- monitor and disassembler from SPHINX. Loads in high memory.
 ELIZA -- adapted for PET by Dennis Cumberton - the computer psychologist
 HAMMURABI -- social simulation
 SLOT MACHINE -- Michael Richter
 CRAPS -- Michael Richter
 BREAKOUT with Sound
 POP SHOT -- from SPHINX - shooting gallery with sound
 STARS -- John Broomhall - children's number guessing game
 LINEQM -- Frank Alexander - solves linear equations using matrix invert subroutine.
 POUNCE -- John Broomhall - kids game. If you don't pounce the right number of spaces, the mouse might run into his hole.
 STAR WARS -- John Broomhall
 AUTO-DOODLE -- Frank Levinson - draws very nice rectangular patterns
 FOURIER -- Frank Levinson - very nice high density graphing--visual demo of Fourier approximation curve fit.
 CRAPS2 -- Earl Wuchter - not a crap game; rolls dice & displays statistics on the rolls. Shows odds, etc.
 DRAW POKER -- Earl Wuchter
 SOLITAIRE POKER -- Dave Howe submitted by Ed Herstein - solitaire version of draw poker. Displays odds as you play.
 PRO FOOTBALL -- Modified by Carl Hennig from SRI Library
 RENUMBER -- Bill Seiler - machine language version
 MATCH GAME -- L Uher - 23 matches
 STAR TREK IV -- Francis Chambers - updated version with good graphics and more features
 BRAIN STRAIN -- Ed Herstein - try to get lights on in all but the center square
 SNAKE -- submitted by Ed Herstein - a 0,1, or 2 player Trap game that speeds up the longer you go.
 YAHTZEE -- Pete Rowe submitted by Ed Herstein - dice game
 HANGMAN -- Grant Paul - has list of 500 words
 HANGMAN 2 -- for 2 players with PET keeping score - needs a little work on display & graphics.
 TAPE TEST -- Bob Huenemann - Help to evaluate tape loading errors.
 COPY -- R Julin - data file manipulation
 TALK & TALKER -- R Julin - Send ASCII characters between 2 PETs via parallel user port.
 LEM -- submitted by Horst Brinkler - lunar lander includes attitude angle and orbit consideration as well as time, altitude, & velocity. English or metric measurements. No graphics.
 INDEX -- David Wilcox - tape index to locate a specific program on a tape.
 KENTUCKY DERBY -- Tom Baker - Horse race for any number of people with betting - good looking horses.
 MAZE -- Hans-J Koch - Creates a single solution maze up to 19*10. Use cursor keys to find way through.
 FLIGHT SIMULATOR -- submitted by Jerry Panofsky - instrument flying. Try to take off and land safely.
 BACKGAMMON -- Bill Hood
 PPONG -- P. Rowe submitted by Ed Herstein - similar to deflection with land mines
 FN MACHINE -- feed numbers through machine, see output, deduce function. Very nice graphics. Pete Rowe subm. by E. Herstein
 WEIGH -- Guess the lightest and heaviest object in 3 tries.

\$2 for the first program including cassette and postage, \$1 for each additional
 -- max 4 per tape. This comes to \$5 for each 4 programs. This "programs on tape service" is priced to cover the cost of a part time person to copy and mail the tapes. If you have a program to add to the list, please send it on tape. We will copy it and return your tape (with program of your choice). Please do not send commercial programs.

Unlist Revisited

Jim Butterfield, Toronto

Larry Tessler's UNLIST appeared in User Notes without much fanfare. If you can read between the lines, however (and cope with the typos) it's quite a blockbuster of a program.

In general, it allows a program to be handled as data. Using the UNLIST key, you can re-process programs as if they were data files, and create such things as program-writing programs, language translators, and many other startling things.

Perhaps the most immediate use of UNLIST for the casual computerist is to merge two programs together. One program could contain subroutines, and these could be merged with other programs to save a lot of typing. It's especially useful to be able to merge a single set of DATA statements into several programs, each of which is set up to process the DATA in different ways.

Brad Templeton (Toronto) has passed me an even more concise way of doing the same thing. I'll go through the whole operation step by step.

First, prepare the program you will want to merge in the following manner:

1. Load the program.
 2. Put a blank tape into the cassette and rewind.
 3. Enter OPEN 1,1:CMD 1:LIST (on single line using colons)
 4. Press RECORD and PLAY as instructed.
 5. When tape stops moving, type ?"POKE 611,0":PRINT#1:CLOSE1
- Your tape is now ready, and PET should be back to normal operation. You may file this tape and use it at any future time.

Now for the merge. When you have your second program loaded into the PET, mount the tape you have previously written. Type OPEN 1, press PLAY as requested, and wait for the tape to stop.

Here comes the tricky bit. Clear the screen, give 4 cursor down's, and type the following line, but DO NOT HIT RETURN: POKE 611,1: POKE 525,1: POKE 527,13: ?"h" (crsr home) Don't hit return. Instead, press cursor home and 6 cursor down's, then type the identical line. This time, hit RETURN at the end of the line and listen to the tape move.

Eventually, things will stop with a ?SYNTAX ERROR or ?OUT OF DATA printed between the two lines, and the tape should stop (if it doesn't, stop it with the RUN-STOP key). The merge is now complete. Type CLOSE 1 to close the file.

(The ?"POKE 611, 0" in paragraph 5 may be unnecessary -- I put it there to guard against a processor crash situation I encountered during early testing.)

[ed. note -- The typos to which Jim refers are the missing cursor control characters which our printer doesn't print. Am relisting UNLIST with lower case characters for cursor control.]

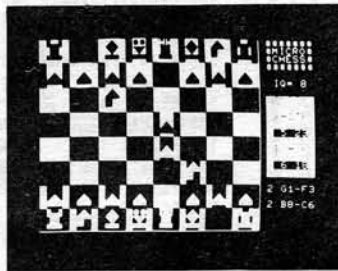
```
0 GOTO 60000: REM UNLIST (LARRY TESSLER)
60000 OPEN 1,1: REM ***FILE SPEC***
60010 GET#1,C$:IFASC(C$)<>13GOTO60010
60020 POKE610,1:Y$="cd":PRINTY$:D=-6:E=252:S=6:C=13:GET#1,C$:IF
C$="R"GOTO60050
60030 PRINTC$:IFASC(C$)<>CTHENGET#1,C$:S=D*((EANDST)=0):IFS60T
060030
60040 Z=2:Z$="GOTO60020":IFS60T060070
60050 CLOSE1:PRINTID$("dERRORdCONTh",S+1,6):STOP:PRINTY$:Z=9:
Y=60000:T=10
60060 FORI=0T07:PRINTY+T*I:NEXT:PRINT0
60070 L=525:FORI=1T0Z+1:POKEI,I,C$:NEXT:POKEI,Z:PRINTZ$:PRINT"h"
:END
```

c=clear screen, d=down, h=home

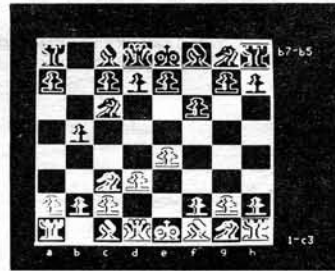
TRS-80



PET



APPLE



PLAY CHESS WITH YOUR COMPUTER!

MICROCHESS is the culmination of two years of chessplaying program development by **Peter Jennings**, author of the famous 1K byte chess program for the KIM-1. MICROCHESS 2.0 for 8K PETs and 16K APPLES, in 6502 machine language, offers 8 levels of play to suit everyone from the beginner learning chess to the serious player. It examines positions as many as 6 moves ahead, and includes a chess clock for tournament play. MICROCHESS 1.5 for

BRIDGE CHALLENGER by **George Duisman** for 8K PETs, Level II 16K TRS-80s, and 16K APPLES: You and the dummy play 4 person Contract Bridge against the computer. The program will deal hands at random or according to your criterion for high card points. You can review tricks, swap sides or replay hands when the cards are known. No longer do you need 4 people to play! **\$14.95**

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4K TRS-80s, in Z-80 machine language, offers 3 levels of play (both Level I and Level II versions are included and can be loaded on any TRS-80 without TBUG). MICROCHESS checks every move for legality and displays the current position on a graphic chessboard. You can play White or Black, set up and play from special board positions, or even watch the computer play against itself! Available now at a special introductory price of only **\$19.95**

STIMULATING SIMULATIONS by **Dr. C.W. Engel** for 8K PETs, 4K Level I and II TRS-80s, and APPLES with Applesoft II: Ten original simulation games such as Forest Fire, Lost Treasure, Gone Fishing and Diamond Thief, progressing from elementary to quite complex with most suitable for schoolchildren. Includes a 64 page book giving flowcharts, listings and suggested modifications ... **\$14.95** (24 hours, 7 days; in Missouri, dial 1-800-342-6600). Or you can mail your order to the address below. Personal Software™ products are now **AVAILABLE NATIONWIDE FROM COMPUTER STORES**. Look for the Personal Software™ display in your local store!

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 4. Press RECORD and PLAY as instructed.
 5. When tape stops moving, type ?"POKE 611,0":PRINT#1:CLOSE1
- Your tape is now ready, and PET should be back to normal operation. You may file this tape and use it at any future time.

Now for the merge. When you have your second program loaded into the PET, mount the tape you have previously written. Type OPEN 1, press PLAY as requested, and wait for the tape to stop.

Here comes the tricky bit. Clear the screen, give 4 cursor down's, and type the following line, but DO NOT HIT RETURN: POKE 611,1: POKE 525,1: POKE 527,13: ?"h" (crsr home) Don't hit return. Instead, press cursor home and 6 cursor down's, then type the identical line. This time, hit RETURN at the end of the line and listen to the tape move.

Eventually, things will stop with a ?SYNTAX ERROR or ?OUT OF DATA printed between the two lines, and the tape should stop (if it doesn't, stop it with the RUN-STOP key). The merge is now complete. Type CLOSE 1 to close the file.

(The ?"POKE 611, 0" in paragraph 5 may be unnecessary -- I put it there to guard against a processor crash situation I encountered during early testing.)

[ed. note -- The typos to which Jim refers are the missing cursor control characters which our printer doesn't print. Am relisting UNLIST with lower case characters for cursor control.]

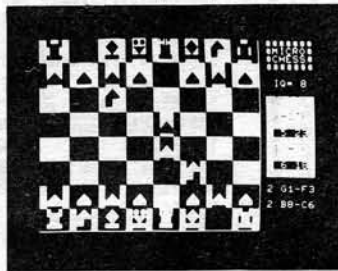
```
0 GOTO 60000: REM UNLIST (LARRY TESSLER)
60000 OPEN 1,1: REM ***FILE SPEC***
60010 GET#1,C$:IFASC(C$)<>13GOTO60010
60020 POKE610,1:Y$="cd":PRINTY$:D=-6:E=252:S=6:C=13:GET#1,C$:IF
C$="R"GOTO60050
60030 PRINTC$:IFASC(C$)<>CTHENGET#1,C$:S=D*((EANDST)=0):IFS60T
060030
60040 Z=2:Z$="GOTO60020":IFS60T060070
60050 CLOSE1:PRINTID$("dERRORdCONTh",S+1,6):STOP:PRINTY$:Z=9:
Y=60000:T=10
60060 FORI=0T07:PRINTY+T*I:NEXT:PRINT0
60070 L=525:FORI=1T0Z+1:POKEI,I,C$:NEXT:POKEI,Z:PRINTZ$:PRINT"h"
:END
```

c=clear screen, d=down, h=home

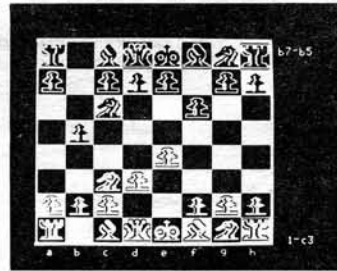
TRS-80



PET



APPLE



PLAY CHESS WITH YOUR COMPUTER!

MICROCHESS is the culmination of two years of chessplaying program development by **Peter Jennings**, author of the famous 1K byte chess program for the KIM-1. MICROCHESS 2.0 for 8K PETs and 16K APPLES, in 6502 machine language, offers 8 levels of play to suit everyone from the beginner learning chess to the serious player. It examines positions as many as 6 moves ahead, and includes a chess clock for tournament play. MICROCHESS 1.5 for

BRIDGE CHALLENGER by **George Duisman** for 8K PETs, Level II 16K TRS-80s, and 16K APPLES: You and the dummy play 4 person Contract Bridge against the computer. The program will deal hands at random or according to your criterion for high card points. You can review tricks, swap sides or replay hands when the cards are known. No longer do you need 4 people to play! **\$14.95**

ORDERS: Check, money order or VISA/Master Charge accepted; programs and cassettes guaranteed. If you have questions, please call us at 617-783-0694. If you know what you want and have your VISA/MC card ready, you can **DIAL TOLL FREE 1-800-325-6400**

4K TRS-80s, in Z-80 machine language, offers 3 levels of play (both Level I and Level II versions are included and can be loaded on any TRS-80 without TBUG). MICROCHESS checks every move for legality and displays the current position on a graphic chessboard. You can play White or Black, set up and play from special board positions, or even watch the computer play against itself! Available now at a special introductory price of only **\$19.95**

STIMULATING SIMULATIONS by **Dr. C.W. Engel** for 8K PETs, 4K Level I and II TRS-80s, and APPLES with Applesoft II: Ten original simulation games such as Forest Fire, Lost Treasure, Gone Fishing and Diamond Thief, progressing from elementary to quite complex with most suitable for schoolchildren. Includes a 64 page book giving flowcharts, listings and suggested modifications ... **\$14.95** (24 hours, 7 days; in Missouri, dial 1-800-342-6600). Or you can mail your order to the address below. Personal Software™ products are now **AVAILABLE NATIONWIDE FROM COMPUTER STORES**. Look for the Personal Software™ display in your local store!

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DISABLING THE PET STOP KEY

Jim Butterfield

1. Run the program below. It will place a Monitor in the second cassette tape buffer.
2. Load any program desired. Don't use cassette tape #2!
3. To enable the non-stop feature type: SYS 832.
4. To disable the non-stop feature type SYS 845. YOU MUST DISABLE THE FEATURE BEFORE READING OR WRITING TAPE

```
100 FOR A=832 TO 878
110 READ B
120 POKE A,B
130 NEXT A
140 END
150 DATA 120,169,99,141,25,2,169,03,141,26,2,88,96
160 DATA 120,169,133,141,25,2,169,230,141,26,2,88,96
170 DATA 169,0,72,72,72,72,76,133,230
180 DATA 32,90,3,234,169,255,141,9,2,76,126,230
```

Machine Language Program

```
0340 78      XPTON SEI
0341 A9 63    LDA #863      Sets Pointer to PRECODE
0343 8D 19 02 STA $219
0346 A9 03    LDA #3
0348 8D 1A 02 STA $21A
034B 58 60    CLI RTS
034D 78      XPTOFF SEI
034E A9 85    LDA #885
0350 8D 19 02 STA $219
0353 A9 E6    LDA #$E6
0355 8D 1A 02 STA $21A
0358 58 60    CLI RTS
035A A9 00    STAKAJ LDA #0
035C 48 48    PHA PHA
035E 48 48    PHA PHA
0360 4C 85 E6 JMP INTPROC
0363 20 5A 03 PRECODE JSR STAKAJ
0366 EA      NOP
0367 A9 FF    POSTCD LDA #$FF
0369 8D 09 02 STA $209      kill stop key
036C 4C 7E E6 JMP RESTORE
```

Ramble

```
1 DIM OKS(5,5),VLU(5,5):GOSUB 500
2 FOR I=1TO4:FORJ=1TO4:READOKS(I,J):NEXTJ:NEXTI
3 DATA32,93,112,109,32,64,110,112
4 DATA32,93,110,125,32,64,109,125
5 PRINT"C"
6 FORI=1TO4:FORJ=1TO4:READ VLU(I,J):NEXTJ:NEXTI
7 DATA 64,110,102,125,109,93,125,102
8 DATA 102,112,64,109,112,102,110,93
10 PRINT"ENTER TENDENCY TO GO STRAIGHT (0-.99999)"
11 INPUT A
12 PRINT"C"
17 FORI=32768TO 32768+39STEP 2 :POKEI+41,125:POKEI+40,109
18 POKE I+1,110:POKEI,112:NEXT
20 FOR J=32768 TO 33727STEP 80
21 POKEJ,112:POKEJ+38,112:POKEJ+41,125:POKEJ-2,109:POKEJ+1,110
22 POKE J+39,110:POKEJ+40,109:POKEJ-1,125:NEXT
23 FOR I=33767-79 TO 33767-40 STEP2:POKEI,109:POKEI+1,125
25 POKEI-40,112:POKEI-39,110:NEXT
40 WY(1)=22:WY(2)=14:WY(3)=28:WY(4)=26
50 H=33000:DR=3
60 FOR I=1TO4:READD(I):NEXT
70 DATA 1,40,-1,-40
75 RESTORE
80 WAYS=WY(DR)
85 NUM=3
90 D1=INT(1+4*RND(1))
92 IF 0=(WAYS AND 2*D1)THEN GOTO 90
95 IF A>RND(1)AND NUM =3 THEN D1=DR
100 SQUARE=PEEK(H+D(D1))
120 FOR I=1TO4:IF OKS(D1,I)=SQUARETHENGOTO200
125 NEXT I
130 NUM=NUM-1:WAYS=WAYS AND NOT 2*D1
140 IF NUM>1 GOTO90
141 D1=1-((WAYS>2)+(WAYS>4)+(WAYS>8))
150 GET Z$:IF Z$=""GOTO200
155 GOTO 2
200 TEMP=PEEK(H)
203 IF TEMP=91 GOTO 250
205 POKE H, VLU(DR,D1)
206 IF TEMP<>32 THEN POKE H,91
210 H=H+D(D1):DR=D1:GOTO 80
250 GET Z$:IF Z$="" GOTO250
255 GOTO 2
500 PRINT"CddddddAUTO DOODLE"
510 PRINT"dd BY FRANK LEVINSON"
520 PRINT"ddd PET USER GROUP"
530 PRINT" SOFTWARE EXCHANGE"
540 PRINT" PO BOX 371"
550 PRINT" MONTGOMERYVILLE, PA 18936"
560 FOR I=1 TO 1500:NEXT I
570 RETURN
READY.
```

PET OWNERS

Ever look at Radio Shack's 232 pg. owner's manual and wish Commodore had one?

We have just published "PETABLE," an introduction to PET Basic, graphics, and capabilities. It includes programs, exercises software/hardware sources, a periodical index, and much more. Send check or money order for \$4.95 to:

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Philipsburg, PA 16866

LINEAR EQUATION SYSTEM

```
5 PRINT" PROGRAM WITHOUT PIVOTING STRATEGY"
6 PRINT
10 DIMC(15,15)
20 INPUT"NUMBER OF EQUATIONS=";N
25 PRINT
30 N=N+1
35 PRINT"INPUT OF COEFF MATRIX BY COLUMN"
40 FOR J=1 TO N
49 PRINT "COLUMN";J
50 FOR I=1TON
60 INPUT C(I,J)
70 NEXT I
90 NEXT J
100 FOR K=1 TOM
110 P=C(K,K)
120 IF ABS(P)<.001 GOTO 310
130 FOR J=K TO N
140 C(K,J)=C(K,J)/P
149 NEXT J
150 FOR I=1 TO M
160 IF I=K GOTO 210
170 Q=C(I,K)
180 FOR J=K TO N
190 C(I,J)=C(I,J)-Q*C(K,J)
200 NEXT J
209 GOTO 210
210 NEXT I
220 NEXT K
230 FOR J=1 TO M
240 X(J)=C(J,N)
250 NEXT J
259 PRINT
260 PRINT "SOLUTION VECTOR"
270 FOR J=1 TO M
280 PRINT J;X(J)
290 NEXT J
300 END
310 PRINT"PIVOT ELEMENT CLOSE TO 0";K
320 END
```

INDEX

David H Wilcox

The following are notes regarding the program:

- 1) "INDEX" is meant to be the first program on the tape cassette and can be loaded in any manner.
- 2) "INDEX" will request the operator to press the 'F.FWD' key on the cassette deck and then to type in the # associated with the name of the selected program to be loaded. The tape will then advance in Fast-Forward to a point just prior to the location of the selected program, which can then be loaded normally.
- 3) If a new program is to be added to the tape, or a program already on the tape is to be updated or replaced, then the operator would simply save that program on a 'work tape', then load "INDEX" and LIST lines 100-199, then type the title of the new program in place of the blank spaces following any program # (or in place of the program name to be replaced), rewind the tape and SAVE the updated "INDEX" and then type RUN. When the tape stops, press 'STOP' and save the new program normally. (i.e. LOAD new program and SAVE it on the INDEX'd tape where it had automatically stopped.)
- 4) Lines 100 to 196 were included with blank spaces for program names to force the program to be the same length on tape regardless of the number of program names to be listed. This will make the tape start in Fast-Forward at the same location each time "INDEX" is run. (Adding or subtracting a few of these lines will not materially affect program operation.)

5) Line 210 will keep the tape drive motor off, regardless of which key is pressed on the cassette, until a program # is typed in. This line is included inside the GET loop (lines 200 to 220) because occasionally when the 'F.FWD' key is pressed while the 'PLAY' key is still down, the sense switch on the play key will chatter or vibrate while opening causing noise on the sense line which would start the drive motor. In addition, this arrangement allows the 'F.FWD' key to be pressed at any time prior to program # selection and the drive motor will remain off.

6) Line 230 assigns a value to N in relation to the decimal value of the ASCII code of the key pressed for program # (N#). As written, it will assign the values 0-9 for the numbers 0-9 and the values 10-35 for the letters A-Z, thus more than 10 programs may be stored even using a GET statement. If only 10 or fewer programs are to be stored, then Line 230 may be changed to:

230 N=VAL(N#):?"SEARCHING FOR";N

7) Lines 240 to 260 start the drive motor, determine the fast-forward running time, and stop the drive motor. The value of 600 in line 240 (lets call it 'V') may be changed to suit a particular situation. At a 'V' of 600, the tape will run in Fast-Forward for 10 seconds which corresponds to 3 min. of tape at normal speed on my PET. Each program is thus recorded at the beginning of a 3 min. block of tape. (It takes approximately 2 min. 10 sec. to record a full 7-K program not including leader.) If all the programs to be recorded on a particular tape are to be less than the full 7-K allowed, then the 'V' of 600 may be changed accordingly. An approximate formula for determining the value of 'V' to use is: $V = 150 + (7164 - \text{FRE}(0)) / 15$. For example, at a 'V' of 350 the maximum program length limit would be 3-K. Line 310, which is a reminder only, should be changed accordingly.

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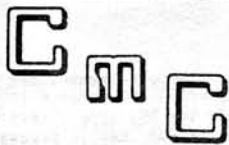
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```

1 REM *** INDEX
2 REM   BY DAVID WILCOX
3 REM
4 REM *** PET USER GROUP
5 REM   SOFTWARE EXCHANGE
6 REM   PO BOX 371
7 REM   MONTGOMERYVILLE, PA 18936
8 REM
40 N$=""
50 PRINT"PRESS F.FWD KEY ON CASSETTE NOW,
60 PRINT"THEN ENTER # FOR SELECTED PROGRAM."
70 PRINT"THE PROGRAMS ON THIS TAPE ARE:"
80 PRINT"  NAME"
90 PRINT"-----"
100 PRINT"0. FIRST PROG. TITLE "
110 PRINT"1. SECOND PROG. TITLE "
120 PRINT"2. THIRD PROG. TITLE "
130 PRINT"3.      ETC.      "
140 PRINT"4.      "
150 PRINT"5.      "
160 PRINT"6.      "
170 PRINT"7.      "
180 PRINT"8.      "
190 PRINT"9.      "
192 PRINT"A.      "
194 PRINT"B.      "
196 PRINT"C.      "
200 GET N$:IF N$<>"" THEN 230
210 IF PEEK(519)=0 THEN POKE 519,52:POKE 59411,61
220 GOTO 200
230 N=ASC(LEFT$(N$,1))-48:PRINT"SEARCHING FOR ";N:IF N>9 THEN
N=N-7
240 POKE 59411,53:TS=TI+N*600
250 IF TI<TS THEN 250
260 POKE 59411,61
270 PRINT"PRESS 'STOP' ON CASSETTE, THEN"
280 PRINT"LOAD SELECTED PROGRAM NORMALLY."
290 PRINT"DOR:"
300 PRINT"SAVE 'NEW PROG' ON THIS TAPE HERE"
310 PRINT"(NEW PROG LIMIT = 7.1K)"
320 END

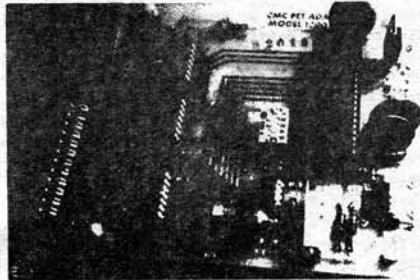
```

CONNECTICUT microCOMPUTER

150 POCONO ROAD - BROOKFIELD, CONNECTICUT 06804

(203) 775-9659



RS-232 PRINTER ADAPTER FOR THE COMMODORE PET

The CONNECTICUT microCOMPUTER ADAPTER model 1200 is the first in a line of peripheral adapters for the COMMODORE PET. The CmC ADA 1200 drives an RS-232 printer from the PET IEEE-488 bus. The CmC ADA 1200 allows the PET owner to obtain hard copy program listings, and to type letters, manuscripts, mailing labels, tables of data, pictures, invoices, graphs, checks, needlepoint patterns, etc., using a standard RS-232 printer.

The CmC ADA model 1200B comes assembled and tested, without power supplies, case, or RS-232 connector for \$98.50. The CmC ADA 1200C comes complete for \$169.00. Specify baud rate when ordering. (300 baud is supplied unless otherwise requested. Instructions for changing the baud rate are included.)

WORD PROCESSOR FOR THE COMMODORE PET

CONNECTICUT microCOMPUTER now has a word processor program for the COMMODORE PET. This program permits composing and printing letters, flyers, advertisements, manuscripts, articles, etc., using the COMMODORE PET and an RS-232 printer.

Script directives include line length, left margin, centering, and skip. Edit commands allow the user to insert lines, delete lines, move lines, change strings, save onto cassette, load from cassette, move up, move down, print and type.

The CmC Word Processor Program addresses an RS-232 printer through a CmC printer adapter.

The CmC Word Processor Program is available for \$29.50.

RS-232 TO CURRENT LOOP/TTL ADAPTER

The CmC ADAPTER model 400 has two circuits. The first converts an RS-232 signal to a 20 ma current loop signal, and the second converts a 20 ma current loop signal to an RS-232 signal. With this device a computer's teletype port can be used to drive an RS-232 terminal, or vice versa, without modification of the port. The CmC ADA 400 can also be paralleled to drive a teletype or RS-232 printer while still using the computer's regular terminal. The CmC ADA 400 can easily be modified to become an RS-232 to TTL and TTL to RS-232 ADAPTER. The CmC ADA 400 does not alter the baud rate and uses standard power supplies. The current loop is isolated from the RS-232 signal by optoisolators.

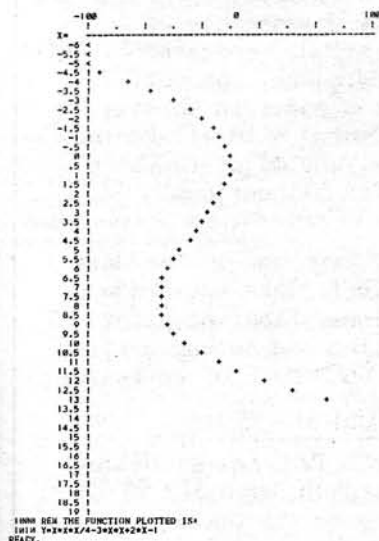
The CmC ADA 400 is the perfect partner for KIM if you want to use an RS-232 terminal instead of a current loop teletype.

The CmC ADA 400S comes with drilled, plated through solder pads and sells for \$24.50. The CmC ADA 400B comes with barrier strips and screw terminals and sells for \$29.50.

This announcement was composed on a COMMODORE PET and printed on a GE TerminiNet using a CmC ADA 1200C printer adapter and the CmC Word Processor Program.

Qty	Description	Baud rate	Price	Total	Mail with remittance or charge information to:
1	CmC ADA 1200B (basic)		\$98.50		CONNECTICUT microCOMPUTER 150 Pocono Road, Room 6 Brookfield, Conn. 06804
1	CmC ADA 1200C (complete)		\$169.00		
1	CmC Word Processor Program (cassette)		\$29.50		
1	CmC ADA 400S (solder pads)		\$24.50		
1	CmC ADA 400B (barrier strips)		\$29.50		
Subtotal					NAME
					COMPANY
					ADDRESS
Connecticut residents add 7% sales tax					CITY
Handling and shipping - add per order			\$3.00		STATE
Foreign air mail - add \$5.00 per order					ZIP
Total included with order					
CHARGE TO VISA *MASTER CHARGE *M/C INTERBANK NUMBER *Expiration date					
Credit card number					
SIGNATURE					

COMMODORE PET HARD COPY OUTPUT USING PET ADA 1200



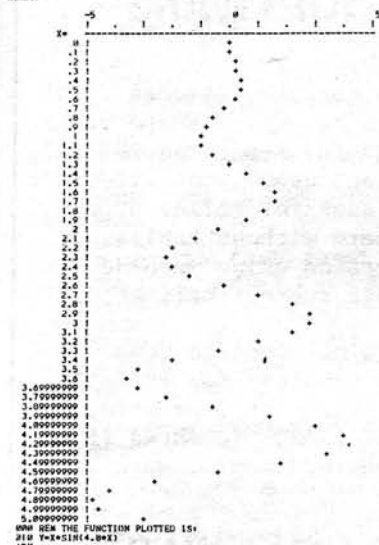
```

10 1
1100 REM THE FUNCTION PLOTTED IS
1110 Y=I*X/4-3*X*X+2*X-1
READY

```

X	Y
0.5	33773159
1	-996164609
1.5	11005018
2	-348653564
2.5	-1.34143229
3	2.89697333
3.5	-3.18648462
4	1.37325972
4.5	1.71562719
5	-4.52790179

```
1000 REM THE FUNCTION PLOTTED IS
1010 Y=X*5/N(4.8*X)
READY.
```



```
5.000000000 ! *
*** REM THE FUNCTION PLOTTED IS:
210 Y=X*SIN(4.0*X)
***
```

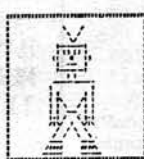
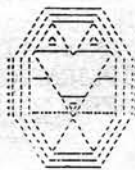


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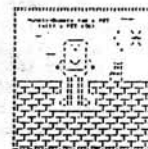
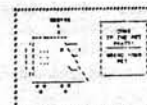
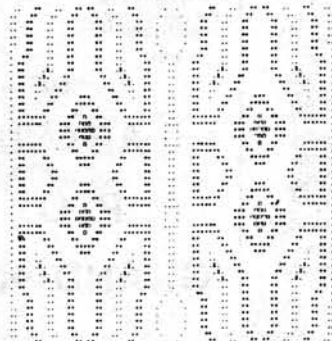
10 OPEN 6,BYCMD 6:LIST
20 REM ACOS AND ARCCOS FUNCTIONS FOR THE COMMODORE PET
30 REM WRITTEN BY RICHARD WIKNER
40 REM CONNECTICUT MICROCOMPUTER
50 REM 150 PITCHING ROAD
60 REM BURNFIELD, CT 06804
70 REM
80 REM *Listed on a GE Terminal 300
90 REM *using a CMC ADA 120M.
90 REM
100 REM OPEN OUTPUT FILE ON DEVICE #6.
110 OPEN 5,8
120 REM
130 REM GET A SINE VALUE
140 INPUT S
150 C=S
160 REM
170 REM THE SINE OF THE ANGLE IS S
180 REM IF THE SIN IS IN THE RANGE OF -1 TO 1, THEN COMPUTE.
190 IF S#1 AND S#-1 GOTO 1050
200 AS=90/ATN(20000
210 REM THE ARC SINE IS AS
220 AS=ATN(S)/(1-5*37-.5)
230 REM THE RESULT IS IN RADIANS. CONVERT TO DEGREES.
240 AS=AS*180/
250 REM THE COSINE OF THE ANGLE IS C
260 IF IF THE COSINE IS IN THE RANGE OF -1 TO 1,
270 REM AND NOT "N" TO 0, THEN COMPUTE
280 IF C#0 THEN 2040
290 AC=90/ATN(3000
300 IF C#1 AND C#-1 THEN 2070
310 AS=C/0/GT0 3000
320 REM THE ARCCOS IS AC
330 AC=ATN(1/(1-C**2) **.5)/C
340 REM THE RESULT IS IN RADIANS. CONVERT TO DEGREES.
350 AC=AC*180/
360 PRINT#5," SIN, COS ARCSIN ARCCOS"
370 PRINT#5,S,
380 FOR N=1 TO 13:LEST STR$(S);PRINT#5," " ;NEXT
390 FOR N=1 TO 13:LEST STR$(AS);PRINT#5," " ;NEXT
400 PRINT#5,AC
410 GOTO 500
420 REM
430 REM
440 REM
450 REM
460 REM
470 REM
480 REM
490 REM
500 REM
510 REM
520 REM
530 REM
540 REM
550 REM
560 REM
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```

SIN, COS	5.73017048	ARC COS	44.2680296
SIN, COS	11.526959	ARC COS	78.46304
SIN, COS	17.4576031	ARC COS	72.523606
SIN, COS	19.1231204	ARC COS	76.528779
SIN, COS	23.5781785	ARC COS	66.418216
SIN, COS	38	ARC COS	68
SIN, COS	36.8609977	ARC COS	53.1281824
SIN, COS	44.717804	ARC COS	45.172994
SIN, COS	46.5448035	ARC COS	43.455395
SIN, COS	53.1381824	ARC COS	36.8609977
SIN, COS	64.1580673	ARC COS	25.8419328
SIN, COS	80.0180618	ARC COS	18.0182363



Native American Indian name



TRENDACK Sales - Carburetors - 1973

```

      ***
      ***
T 201 # TYPE C ***
H ***
O ***
A ***
D ***
S 151 # TYPE A ***
***
***
O 181 ***
***
***
U ***
N ***
T ***
S ***

```

1 JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Powers of X

X	X*2	X*3	X*P1	X*5.25	X*5
50	2500	12500	217550.221	8306083735	7.871067818
1000	100000	1000000	1910487.58	3.162277147E+11	
150	22500	3375000	68618777.28	2.657553572E+11	12.244478448
200	40000	8000000	139139139.2	1.283392909E+12	14.14213536
250	62500	15625000	31440555.2	5.11330327E+11	15.13002722
300	90000	27000000	90548954.8	8.11315327E+11	17.3259811
350	122500	42750000	9271822.8	2.271327137E+13	18.7625000
400	160000	64000000	1426481.41	1.42648141E+13	20
450	202500	91125000	21642274.7	4.089058205E+13	21.2132834
500	250000	125000000	381245248	1.47778127E+14	22.36070058
550	302500	166375000	494400000	2.43727203E+14	23.45470768
600	360000	216000000	534342301	3.05452281E+14	24.4940574
650	422500	274625000	86812634	5.8586172E+14	25.49596708
700	490000	343000000	1210242597	8.73272703E+14	26.45947076
750	562500	421875000	1.577213798E+09	1.24185712E+15	27.38612709
800	640000	512000000	2.191204259E+09	1.7369092E+15	28.28427133
850	722500	614125000	3.06627272E+09	2.39757203E+15	29.15475788
900	810000	729000000	1.98097047E+09	3.23246031E+15	30
950	902500	857375000	2.62344147E+09	4.29546825E+15	30.8222666
1000	1000000	1E+09	2.65035658E+09	4.791277147E+15	31.6227766

Powers of X

X	K*2	K*3	K*P1	K*5.25	K*5
5H	250H	1250H	217550.221	303698315	7.8716678
10H	500H	1800H	1910487.58	3.1622774E+18	
15H	2250H	3375H	8061077.28	2.2653572E+11	12.2474487
20H	6250H	18000H	169350435.3	1.2838209E+12	14.1421356
25H	13750H	33750H	1000000000.2	3.0000003E+11	25.8113803
30H	9000H	27000H	685408505.8	1.8113133E+13	17.3205891
35H	12250H	42000H	9627122.92	2.7173527E+13	18.7802659
40H	16000H	56000H	14094000000.0	4.2424232E+13	
45H	20250H	71250H	2164227147	6.4098958E+09	21.312834
50H	25000H	87500H	381345240	1.7777212E+14	22.3666708
55H	30250H	105000H	5400000000.0	2.2444444E+14	23.513131
60H	36000H	126000H	53423420	3.8485208E+14	24.4940474
65H	42250H	148000H	867216234	5.9586172E+14	25.4909076
70H	49000H	171000H	807200935.9	8.2444444E+14	26.513131
75H	56250H	191250H	1.07713708E+09	1.7420912E+15	27.3851270
80H	64000H	224000H	1.3102042E+09	2.4609922E+15	28.2642014
85H	72250H	255000H	1.55061277E+09	3.2844444E+15	29.1450959
90H	81000H	297000H	1.8007707E+09	4.23244603E+15	
95H	90250H	337500H	2.0577550E+09	5.3944682E+15	30.82267
100H	100000H	400000H	2.6503560E+09	6.8222222E+15	32.5277004

CCC

CONNECTICUT microCOMPUTER

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VIEW

Jim Butterfield
from an idea by Brad Templeton, Toronto

Curious about what's happening in PET's memory? VIEW throws an image of one page (256 bytes) of memory onto the screen. All PET functions - including Basic - continue to work as before, except cassette tape I/O.

Switch VIEW on and off with a SYS (826) command. Select the page you wish to view by poking 849 with a page number. Interesting pages are:

- 0 - zero page; cursor controls and Basic inputs
- 2 - timers are various control pointers
- 4 - start of Basic; will change only when you change the Basic program
- 31 - upper RAM memory; string constants
- 232 - I/O registers and timers (try starting your cassette or hitting the keyboard)

Once you run VIEW, the machine language will remain in residence until you turn the PET off or use tape buffer for something else.

```
100 FOR J=826 TO 858 : READ X : POKE J,X : NEXT J : END
110 DATA 120,173,25,2,73,200,141,25,2
120 DATA 173,26,2,73,229,141,26,2,88,96
130 DATA 162,0,189,0,0,157,0,128,202,208,247,76,133,230
```

For those who would like to track the machine language:

033A 78	ON-OFF SEI	
033B AD 19 02	LDI VECTOR	
033E 49 C8	EOR #3C8	
0340 8D 19 02	STA VECTOR	
0343 AD 1A 02	LDI VECTORHI	
0346 49 E5	EOR #E5	
0348 8D 1A 02	STA VECTORHI	
034B 58 60	CLI RTS	
034D A2 00	VIEW	LDX #0
034F BD 00 00	LOOP	LDI xx00,X from page
0352 9D 00 80		STA \$8000,X to screen
0355 CA	DEX	
0356 D0 F1	BNE LOOP	
0358 4C 85 E6	JMP INTERRUPT	

Hardware Reset

Several people have inquired about reset capability for PET. The hardware reset can easily be added if desired by using a normally open pushbutton to ground A27 (RES) on memory expansion connector (the pushbutton closes the circuit from A27 to B27).

If you don't want to use the memory expansion port, J.R.Kinnard suggests the following:

Near the video connector at circuit board coordinates D9 is a 555 timer module which furnishes the power-on-reset for the system. The 555 is the only 8 pin module on the board. Just behind and to the right of the 555 is a 1 megohm resistor (brown-black-green-gold) which lies parallel to the front edge of the board. Momentarily grounding the end of the resistor farthest away from the 555 module will cause a power-on-reset which will clear memory and reset all registers to their initial state.

A pushbutton switch can be mounted on the side of the bottom cover near the right front corner where it will not be accidentally pushed. Connections between the switch and circuit board can be made with miniature test clips to allow easy removal if needed. Ground can be picked up from the case or at the left end of the diode nearest the power connector. A 1000 ohm resistor can be inserted in series with the switch to prevent system damage if the test clips are incorrectly connected.

MACHINE LANGUAGE SOFTWARE

DISCOVER the most well-kept secrets of the PET with this sixty-page disassembly of the entire 14K ROM. The listing, generated by PET itself, provides the addresses, opcodes, mnemonics, and addressing modes in an easy to read and understand format. With all tables, subroutine entry points, and major routines labeled, it is a MUST for all serious programmers.

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TICTACTOE -3-D version using machine language subroutine(fast)..\$8

All programs are on ready-to-load digital quality cassettes for 8K PETS. 20% discount on order of 3 or more. VISA/BA or MASTERCHARGE accepted if you include card# and expir. date. POSTAGE PAID IN U.S.

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Dynamic Keyboard Revised

Mike Louder 19 August 1978

Here is a technique for adding GOTO and GOSUB expressions adding, changing, or deleting BASIC statement lines while a program is running.

Decimal addresses: keyboard buffer -- 527-536
buffer counter -- 525

If a BASIC program is interrupted with a STOP or END, the keyboard monitor searches the keyboard buffer and executes any "ASCII" instruction that may have been typed in while the program was running. By using BASIC to POKE the buffer and appropriately interrupting the run mode, GOTO (expression) is easily implemented. Adding new lines to your program is a more involved process with a few known disadvantages:

1. Resident screen graphics will be interfered with.
2. Changing BASIC "lines" will un-link and reset the variables list to zero.
3. Subroutine pointers are lost.

If the routine is not used to change your BASIC code, only (1) above applies.

Try this GOTO (expression) demo:

```
10 X=10
20 L=X*10: GOTO 50000
100 X=X+10
300 X=X+10: GOTO 20
400 PRINT "THE PET HAS A DYNAMIC KEYBOARD " : END
50000 PRINT "cdadGOTO" L "h": POKE 525, L: POKE 527, 13:
END
```

REM: clear screen and position GOTO L so that cursor is located on the left after PRINT "h" and exiting BASIC with END. "Load" buffer with a count of 1 and a 13 code which represents the same action as pressing the RETURN key.

A simple example using "L=(expression)": GOSUB 50000:

```
10 INPUT AREA CODE
20 L=AREA CODE*10: GOSUB 50000
30 GOTO 10
6060 ?" KENTUCKY :
6061 ?" ASHLAND, BUTLER, COVINGTON & LEXINGTON.":
RETURN
etc.
```

The following utility routine is self explanatory. Call with a GOTO or RUN 60000:

```
60000 PRINT "(CLR) DELETE LINE NUMBERS FROM J TO K : 'J,K'
60001 PRINT
60002 PRINT " REM J & K ARE INTEGERS FROM 0 TO 65535.
60003 PRINT
60004 INPUT J,K
60010 PRINT "(CLR) (DOWN) (DOWN)
60011 FOR I = J TO J + 8 : IF I > K THEN 60015
60012 PRINT I
60013 NEXT
60014 PRINT "J = " J + 9 " : K = " K " : GOTO 60010
60015 POKE 525, 10 : FOR N = 0 TO 9 : POKE 527 + N, 13 : NEXT
60016 PRINT "(HOME)" : END
```

60010 Clear screen and position each group of 9 consecutive line numbers so that the cursor is in front of the top number after exiting BASIC at line 60016

60011 Generate nine consecutive line numbers until I>K
60012 Print line numbers on screen.
60014 10th item on list. Since BASIC variables are set to zero, save K and update J on screen. Return to BASIC line 60010.
60015 "Load" keyboard counter with a maximum count of 10 and fill the buffer with the ASCII code which represents the same action as pressing the RETURN key (13).

60016 Position cursor at HOME then exit BASIC and execute 10 consecutive RETURNs then return to BASIC via GOTO 60010.

Now change line 60012 to:

```
60012 PRINT I " ?" CHR$(34) CHR$(34) CHR$(20) "THE PET HAS A
DYNAMIC KEYBOARD.
```

and add: 510 END

Watch the action after : RUN 60000; J, K = 400, 500 : then RUN 400

Changing 60012 back to "PRINT I" will allow you to delete lines 400 through 510.

As an example of generating new DATA lines as the result of a complex search-compare operation or involved math routine, change line 60012 to:

```
60012 PRINT I*10 "DATA" 2+I " , " I+2
```

and add:

```
10 J=1: K=30: GOTO 60010
```

Using a technique similar to above, the PET "typed in" a large additional DATA table for the Joseph Roehrig "3-D Tic-Tac-Toe" game (Kilobaud Apr 77). Now it takes only 24 seconds to make the first move.

The following suggests a way to effectively "load" 9 to 12 K programs into the PET's 7 K RAM memory. Many excellent programs lack user instructions because of large dimensioned arrays. The program listing may take only 3 to 4 K of memory, but as soon as the program pointer sees a DIM() statement nearly 7 K is needed. The QUBIC game is a good example.

Change lines 60011, 60012 and 60014 :

```
60011 FOR I = J TO J+8 : IF I > K THEN L = 20
60012 PRINT I
60014 PRINT "J = " J + 9 " : K = " K " : GOTO " L
```

Add :

```
60006 J = 59000 : K = 60015
60008 L = 60008
```

Program :

```
10 GOTO 59000
20 POKE 59409,60
30 DIM A (255,4)
40 PRINT "(CLR) THE PROGRAM NOW TAKES
50 PRINT 7167-FRE (0) "BYTES TO RUN.
60 PRINT : PRINT "PROMPT USER TO RELOAD PROGRAM TO SEE
70 PRINT "A REPEAT OF INSTRUCTIONS." : END
59000 PRINT "(CLR) THIS PROGRAM PRESENTLY REQUIRES
59010 PRINT 7167-FRE (0) "BYTES OF MEMORY.
59020 PRINT : PRINT "AFTER YOU READ THIS, THE SCREEN WILL
59030 PRINT "BLANK FOR 1 MINUTE 10 SECONDS WHILE
59040 PRINT "LINES 59000 THROUGH 60016 ARE DELETED.
59050 PRINT : PRINT "THAT INCLUDES THE LINE EDITING ROUTINE
59060 PRINT : PRINT "PRESS ANY KEY TO CONTINUE
59070 GET A$: IF A$ = "" THEN 59070
59080 POKE 59409,52 : GOTO 60006
```

The deleted lines could have been portions of a BASIC program that produced a few intermediate variables to be temporarily stored.

[ed. note. Mike had a list of credits at the end of his article. These were: PET User Notes for CHR\$(34) codes; Sphinx (CA Bay area user group) for PET memory map; fundamental idea from HP-65 User Club and Peninsula School "DRAW 8K" (Peoples Computers); Lennie Cooper and Leonard Tramiel of Commodore for address info; and in particular Mike Richter for both debug and development assistance.]

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____ WHEN AVAILABLE
____ CASSETTE 1 _____ CASSETTE 4
____ CASSETTE 5

PET Game Console

Tom Finley Hampton, VA

[ed. note. Tom sent a schematic for a nice 2 joystick, 2 button and sound configuration, all in one package hooked to the PET parallel port. The joysticks he used are the 3 for \$10 variety you see in the magazines and at computer shows. Tom had the entire configuration mounted in a 5x6.5x2" bakelite box. I played with his game console, and thought it was an excellent arrangement. Tom was running a joystick lunar lander where the player had to move the landing module both down and left or right over a rough terrain to a safe landing spot.

Included here are 2 segments of his program. Lines 20300 to 20330 comprise a machine language routine to check the joystick positions. The routine is accessed by USR function, as seen in lines 1010 and 1012, in the process of determining the X and Y coordinates. (This program only used one of the joysticks.)

999 REN DETERMINE MOVES

1003 WAIT59456,32,32

```
1010 XX=USR(1)
```

```
1012 YY=USR(2)
```

1015 HT=((XX-102)/133)↑3

1035 VT=((YY-62)/80)↑3+1

```
1036 FU=FU-ABS(VT)-ABS(HT):F#=STR$(FU+1000)
```

```
1037 IFFU<=0 THEN VT=0:HT=0:GOTO 1040
```

```
1038 IFHV>3/DDANDQ=0THENPRINT"FUEL=";MID$(F$,3,3):Q=1:GOTO1040
```

```
1039 PRINT "FUEL="; MID$(F$,3,3):Q=0
```

1040 $VV=VV-1+VT$ 1045 $HV = HV + HT$

READY.

20300 FBI0=826T0854:READNN:POKEIO,NN:NEXT

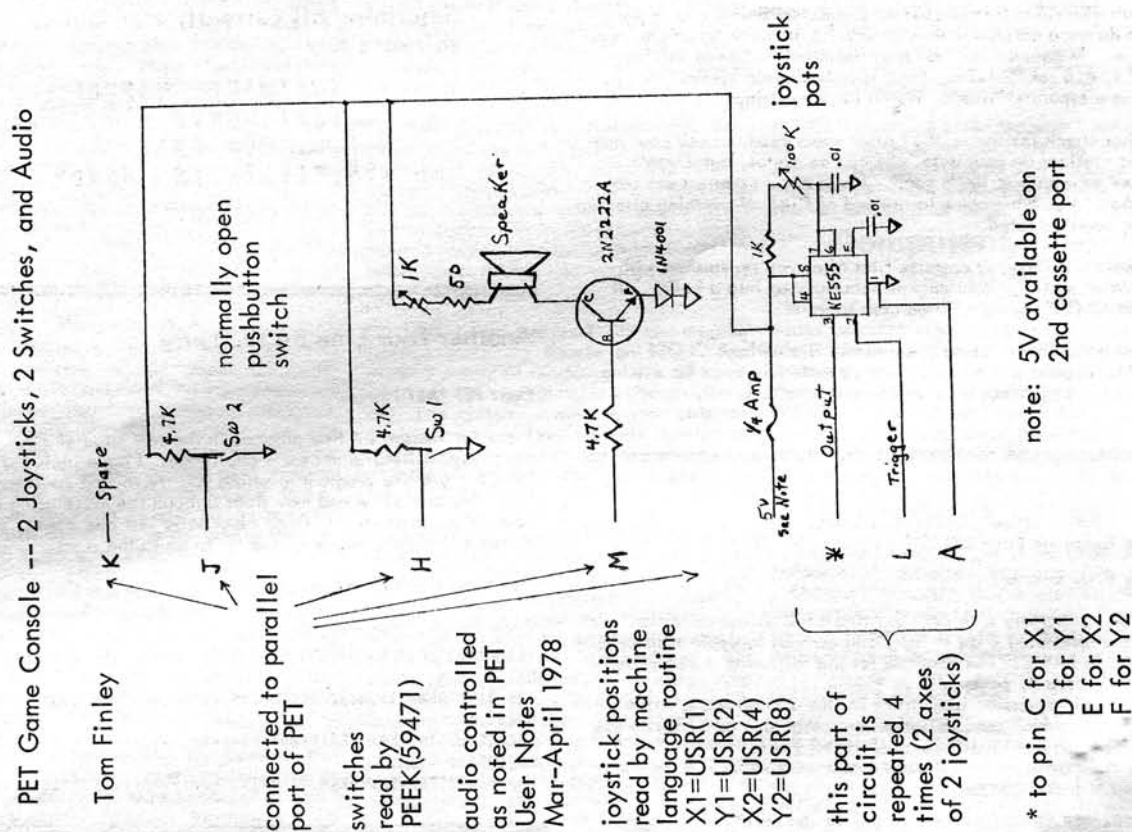
20310 DATA32,167,208,162,0,138,141,79,232,169,128,141,79,232,16
5,180

20320 DATA 232.44, 79, 232, 208, 250, 138, 168, 169, 0, 76, 120, 210

20325 POKE1,58:POKE2,3:POKE59459,128

20330 RETURN

READY.



Cassette File Usage Summary

Jim Butterfield

The following information has been passed around users, and is now "official" with the issuance of a Commodore bulletin. It seems worth while to summarize briefly:

1. Opening a file for writing: an omission in current ROM programs makes it highly desirable to precede all OPEN statements with a couple of POKEs:
before OPEN x,1, .. for writing: POKE 243,122:POKE 244,2
before OPEN x,2, .. for writing: POKE 243,58: POKE 244,3
 2. When writing tapes, it is useful to increase the spacing between tape blocks -- otherwise you might miss a block during subsequent reading. There are several approaches to this. My technique is to call the following subroutine immediately after each PRINT#:
- | Cassette 1 | Cassette 2 |
|------------------------------|------------------------------|
| 950 IF Z9<=PEEK(625)GOTO 990 | 950 IF Z9<=PEEK(626)GOTO 990 |
| 960 POKE 59411,53 | 960 POKE 59456,207 |
| 970 FOR Z9=1 TO 60:NEXT Z9 | 970 FOR Z9=1 TO 60: NEXT Z9 |
| 980 POKE 59411,61 | 980 POKE 59456,223 |
| 990 Z9=PEEK(625):RETURN | 990 Z9=PEEK(626):RETURN |
3. Even with the above coding, it seems wise to guard against a potential "dropped block". Think in terms of writing a "number of items" total on tape so that when reading, you can check that nothing has been lost.
 4. Don't PRINT# a line of over 80 characters unless you're prepared to do some careful work with GET# statements when you read it back in. In general, avoid "print punctuation" when writing (PRINT#1,A,B or PRINT#2,X\$;Y\$). Each data element can be written as a separate "line". Watch for long strings.
 5. Either check the value of ST after every read, or use your own checking routines on your data. ST can be useful, but doesn't guarantee your data is 100% good. IF ST=0 .. no errors are seen. IF ST>63 .. you have come to the end of file. If anything else, an error has been detected.
 6. Always CLOSE your cassette files after you're finished with them. When writing, your data is accumulated into a buffer. If you don't CLOSE, it may not go onto tape.

Most BASIC errors about the cassette file without CLOSEing it. If this happens while you have a cassette file open for writing, better start over .. your tape will likely have data missing.

Machine Language From BASIC

Filler by P.U. Group

To be compatible with most existing 6502 object code listings, I leave the assembled code in hex, and convert to decimal prior to the POKE in BASIC. The example for the following poked code is from Vol 1, Issue 4, page 9.

A logical expression like HH>9 in line 200 returns a value of -1 if true, which used to bother me. Would it be better to use either HH=HH-7*ABS(HH>9) or IF HH>9 THEN HH=HH-7 ?
The PET manual only indicates a non-zero value if a logical expression is true.

```
50 S=6400: REM "Start of mach. code in decimal"
100 READ H$:IF H$="ZZ" GOTO 500
200 : HH=ASC(H$)-48: HH=HH+7*(HH>9)
250 : HL=ASC(RIGHT$(H$,1))-48: HL=HL+7*(HL>9)
300 : DEC=HL+16*HH
350 POKE S,DEC: S=S+1: GOTO 100
500 SYS 6400
600 DATA A2,00, 8A, 9D,50,81, EB, D0,F9, 60, ZZ
999 END
```

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Another Four Line BASIC Entry

Dear PET User Notes:

I saw Art Hudson's 4 line program in the last issue of PUN, and I am always willing to accept a challenge. I have included "SHORT-MAZE", a 4 line program in which you try to find your way to the 'S'. You are the * and may steer through the maze using the keys '5' to go down, '4' to go diagonally left and down, '6' to go diagonally right and down, and '9' to go to the right.

Hope you like the program.

Andy Fraley, Reading, PA

```
10 PRINT"C":CLR:FOR I=32808T033765:POKE I,INT((3*RND(10))+1)*32:N
EXT I
20 TI$="000000":A=32768:POKE 80,0:POKE 84,39:POKE 86,41:POKE 89,1:P
OKE 85,40
30 GETS:A$=STR$(PEEK(S+80)):A=A+VAL(A$):IF PEEK(A)=640RTI$>"0001
00"THEN 10
40 POKE 33767,36:POKE A,42:PRINT"*****";TI$:GOTO 30
```

```
1 "PET LINE INDENTATION FOR BASIC WITH STYLE
2 "JOHN F GARST UNIVERSITY OF GEORGIA
3 : REM
10 FOR I=1 TO 5
20 : FOR J=1 TO 8
30 : NEXT J
40 NEXT I
```

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```

4 PRINT"NONZERO PIVOT ELEMENTS STRATEGY"
5 PRINT
6 PRINT"THE PROGRAM FINDS THE INVERSE OF THE LEFT HAND
  COEFF MATRIX
7 PRINT"AND SOLVES FOR THE ROOTS OF THE LINEAR EQ SYSTEM
10 DIMC(15,15):DIMJ(40)
15 PRINT
20 INPUT"NUMBER OF ROWS OF THE MATRIX";N
30 PRINT"I=ROW J=COLUMN"
40 FORI=1TON
45 PRINT
50 FORJ=1TO N+1
60 PRINT"I=";I;"J=";J
70 INPUTC(I,J)
80 NEXTJ
90 NEXTI
100 GOSUB600
120 STOP
600 PD=1
630 FOR L=1 TO N
640 DD=0
650 FOR K=1 TO N
660 DD=C(L,K)*C(L,K)+DD
670 NEXT K
680 DD=SQR(DD)
690 PD=PD*DD
6100 NEXT L
6110 DM=1
6120 FOR L=1 TO N:J(L+20)=L:NEXTL
6130 FOR L=1 TO N
6140 CC=0:M=L
6150 FOR K=LTON
6160 IF(ABS(CC)-ABS(C(L,K)))>0GOTO6190
6170 M=K
6180 CC=C(L,K)
6190 NEXT K
6200 IF L=M GOTO6260
6210 K=J(M+20)
6220 J(M+20)=J(L+20):J(L+20)=K
6230 FOR K=1 TO N
6240 S=C(K,L):C(K,L)=C(K,M):C(K,M)=S
6250 NEXTK
6260 C(L,L)=1:DM=DM*CC

```

```

6270 FOR M=1 TO N:C(L,M)=C(L,M)/CC:NEXTM
6280 FOR M=1 TO N
6290 IF L=M GOTO6340
6300 CC=C(M,L)
6310 IF CC=0 GOTO6340
6320 C(M,L)=0
6330 FOR K=1 TO N:C(M,K)=C(M,K)-CC*C(L,K)
6335 NEXTK
6340 NEXTM
6350 NEXTL
6360 FORL=1 TO N
6370 IF J(L+20)=L GOTO6470
6380 M=L
6385 M=M+1
6390 IF J(M+20)=LGOTO6410
6400 IF N>MGOTO6385
6410 J(M+20)=J(L+20)
6420 FORK=1 TO N
6430 CC=C(L,K):C(L,K)=C(M,K)
6440 C(M,K)=CC
6450 NEXTK
6460 J(L+20)=L
6470 NEXTL
6480 PRINT
6490 FOR J=1 TO N
6500 PRINT
6510 PRINT"COLUMN";J
6520 FOR I=1 TO N
6530 PRINTC(I,J)
6540 NEXTI
6544 PRINT"PRES KEY"
6545 GETA$:IF A$="" THEN 6545
6550 NEXTJ
6560 A=0
6565 PRINT"ROOTS"
6570 FORI=1 TON
6580 FORJ=1TON
6590 A=C(I,J)*C(J,N+1)+A
6600 NEXTJ
6610 PRINTI,A
6615 A=0
6620 NEXTI
6630 RETURN
READY.

```

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